WELLCOME

BRITISH ASSOCIATION.

At a Meeting of the Council of the British Association at Plymouth, July 28th, 1841,

Resolved,—That Mr. Nasmyth's abstract of his communication to the Meeting of the British Association at Birmingham, be printed in the next volume of the Association Reports, accompanied by the statement, which has been now read and approved by the Council, of the causes of the delay which has taken place in its publication.

That copies of the statement be transmitted, as soon as they can be printed, to Messrs. Owen and Nasmyth, and to the President, Vice-Presidents and Officers of the Geological and Medical Sections, who have kindly complied with the former requests of the Council to act as a Committee of reference on this subject.

At the Meeting of the British Association in Birmingham in August 1839, Mr. Nasmyth communicated three papers, one to the Geological Section, on the Structure of Fossil Teeth; a second to the Medical Section, on the Microscopic Structure of the Teeth; and a third to the Medical Section, on the Structure of the Epithelium.

Agreeably to the practice of the Association, the paper read to the Geological Section was delivered to the Secretaries of that Section, Dr. Lloyd and Mr. Strickland; and an abstract of its contents having been prepared by Dr. Lloyd, for insertion in that portion of the annual volume which contains notices of the proceedings of the Sections, the original memoir and the abstract were transmitted to the Assistant General Secretary (Mr. Phillips), by whom the memoir was returned to Mr. Nasmyth.

With respect to the two papers read before the Medical Section, the practice above mentioned was not followed: no abstract of the contents of these papers was furnished by or through the Secretaries of the Section to the Assistant General Secretary.

Notices of Mr. Nasmyth's papers appeared in the Athenæum and Literary Gazette of the period: those journals usually obtain such notices either from authors themselves or from reporters of their own: in the present case the Council have been informed by the respective editors, that the report in the Athenæum of the two papers read to the Medical Section was supplied, and the proofs corrected, by Mr. Nasmyth himself, and the notice of the geological paper by the reporter of the Athenæum; and that the report in the Literary Gazette was drawn up by the reporter of that journal, from a rough manuscript furnished to him by Mr. Nasmyth.

In the October following the meeting, Mr. Nasmyth applied to Mr. Phillips to know whether the papers read by him at the meeting would be printed entire, or in the form of abstracts; and was acquainted in reply, that, according to usage, brief abstracts only could be inserted in the notices published by the Association, and unaccompanied by diagrams; the original memoirs and drawings being the author's own property, and at his own disposal.

On January 28, 1840, Mr. Nasmyth informed Mr. Phillips that he was preparing abstracts of his papers, and desired to know whether the papers read to the Geological and Medical Sections on nearly the same subject should be reported on as one, or kept separate. He also requested Mr. Phillips to obtain for him, from the Secretary of the Geological Section, the original memoir read at that Section, as an application which he had made for it himself remained unanswered, and he had only rough notes of that paper from which to make the abstract. Mr. Phillips informed him in reply, that one consecutive abstract of the three papers would be preferable, urging brevity and despatch; he at the same time returned the Geological memoir (as already stated) on or about the 10th of February.

On the 24th of February Mr. Nasmyth transmitted to Mr. Phillips an abstract, which he stated to contain the material points of the three papers, abbreviated as much as possible, and requested 200 private copies. Mr. Phillips has preserved no copy, and has no distinct recollection of his reply to this request, but thinks it probable he stated the custom of the Association in regard to private copies, and referred Mr. Nasmyth to the printer, Mr. R. Taylor, from whom he would have to receive them.

On the 2nd of April Mr. Nasmyth wrote to Mr. Phillips, expressing surprise at having that morning received in type "a small fragment of a separate report of one of his papers," after having been requested to give the substance of his three papers in one consecutive abstract, and having complied with that request. He was informed in reply, that it was by an error that any notice of Mr. Nasmyth's geological paper had been put amongst the papers of that section, beyond a mere reference; that it should be cancelled; and that it was intended to give the abstract furnished by Mr. Nasmyth in one continuous article in the proceedings of the Medical Section; but as the manuscript appeared very long, Mr. Phillips suggested some omissions, which being assented to by Mr. Nasmyth in a letter of the 10th April, the manuscript was sent to the printing-office. The proofs, of which the printer states there were several, passed directly between Mr. Nasmyth and the printing-office, the manuscript and all the proofs, except the last corrected revise, being retained by Mr. Nasmyth. All the other sheets of the volume passed through Mr. Phillips's hands in their progress through the press, as is the usual practice: the exception in this case appears to have been occasioned by Mr. Phillips's temporary absence from York, and the printer's desire to hasten the volume through the press.

When the proofs were finally corrected, Mr. Nasmyth applied to the printer for 100 private copies, and was informed that, without an order, his request could not be complied with until the volume was published. Mr. Nasmyth then enclosed, or brought to the printing-office, a note from Mr. Phillips to himself, the exact purport of which Mr. Taylor cannot now recall, but which appeared to him at the time to authorize a compliance with Mr. Nasmyth's request: the copies were accordingly delivered.

On June 10 Professor Owen wrote to Mr. Phillips, calling his attention to the following sentence in the Medical Gazette of the 5th of June:—"In "Mr. Nasmyth's own report given in the Transactions of the British Asso-"ciation, which has been printed separately, and of which a copy is now "before us, we find it stated that the ivory is neither more nor less than the "ossified pulp, and that it can in no wise be regarded as an unorganized "body." Mr. Owen denied, on the authority of the contemporaneous reports in the Athenæum and Literary Gazette, that Mr. Nasmyth's papers read at Birmingham would justify an abstract containing the statement thus printed in the Medical Gazette, and claimed the theory of the development of teeth, ascribed therein to Mr. Nasmyth, as his own, communicated to the French Institute and published in the 'Comptes Rendus' in the December following the meeting at Birmingham. Mr. Owen concluded by requesting Mr. Phillips to suspend the publication, in the volume of the Association's Reports, of the abstract containing the statement in the Medical Gazette, until its fidelity should be shown by comparison with the original documents.

Mr. Phillips expressed, in reply, his surprise at the information received from Mr. Owen, inasmuch as not having seen any proofs, he was not aware that Mr. Nasmyth's abstract had passed through the press, and as he had certainly not meant to have sanctioned the delivery of any private copies before the publication of the volume; that Mr. Nasmyth, however, could not be regarded as at all responsible for these irregularities; that full confidence had always been placed in the communications from authors, and that no such question had ever occurred before; and that unless Mr. Owen should take the formal step of an appeal to the Council, in which case it would become his (Mr. Phillips's) duty to await the directions he should receive from that body, he could neither suppress nor suspend the publication.

On the 24th of June Mr. Phillips addressed the following letter to Mr. Nasmyth:—

"Sir, "York, June 24, 1840.

"I have this moment received from Mr. R. Taylor, for the first time, a proof of the abstract of your memoirs on Odontology, and am concerned to find that you have made *additions** to it since I forwarded the MS. to be set up. This is grievous; but what astonishes me more, is to learn that, without my knowledge, you have received copies of the paper in this unauthentic state, and communicated extracts, or the whole, to a Medical Review.

"These unfortunate circumstances place me in a painful position; but their effect is more to be regretted on your account, since they deprive me altogether of the power of substantiating the authenticity of your communications. "Yours very truly,

"*Alexander Nasmyth, Esq.*" "John Phillips."

To this letter Mr. Nasmyth replied as follows:—

"*To Professor Phillips.*

"13 A, George Street, Hanover Square,
June 27, 1840.

"Sir,

"It is with feelings of no little astonishment that I perused your letter of June 24th, received yesterday; and I am quite at a loss to divine in what way I have deviated with respect to the publication of my abstract in the Transactions from the ordinary course of proceeding. More than six weeks ago, a proof of my paper was transmitted to me, and I was never more surprised than on learning that you did not receive one before June 24th. I corrected my proof, and received a revise of it, which I duly returned; and of course had every right to presume that either the proof or revise was submitted to the Editor of the publication to which I was contributing. With respect to the corrections made, I at once undertake to prove that they consisted in *no interpolation whatever of new matter*, but merely in alterations, rendering the abstract a more faithful digest of my papers *as reported in the Literary Gazette and Athenæum*, and am therefore still more unable to understand the propriety of this interference with my clear right to do justice to my papers in their authentic report. As to the printing separate copies of my abstract, as I have had several letters from you, authorising me to give publicity to it in any way I choose, I cannot suppose I was doing wrong in making use of a permission freely granted.

"I remain, Sir, your obedient servant,

"A. J. Nasmyth."

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* The words in Italics in this and the subsequent letters, and in the reports to the Council, were underlined in the originals.

On the 18th of July, Mr. Owen addressed the following appeal to the Council, to Mr. Yates, Secretary of the Council; and informed Mr. Phillips that he had taken this step:—

"My dear Sir, "Royal College of Surgeons, July 18, 1840.

"You may feel assured that it is with very great regret that I trespass on your valuable time in respect of a personal matter: if it had been, however, merely personal, I should have refrained; but the case is one that might be quoted to the detriment of the character of the Scientific Transactions of the British Association, with regard to the laxity with which authors, communicating their views at the meeting, are afterwards allowed to represent themselves as having so communicated their views, when the volume comes, some months afterwards, to be published. My request is, that the publication of Mr. Nasmyth's paper in the forthcoming volume be suppressed, or the original paper, as read at Birmingham in August last, be substituted, on the ground that it has been altered by the author, both in the way of substitution of new matter, and omission of old, in order to include a discovery of mine, published December 16, 1839, and likewise, because the author has made use of the proof of his memoir, as so altered, to found a charge of plagiarism against me, which has been published, anonymously, in the Medical Journals, Lancet, and Medical Gazette.

"In proof of these allegations, I transmit the following:—

"1. Literary Gazette, containing a verbatim* report of Mr. Nasmyth's Memoir, as read at Birmingham, August 12, 1839.

"2. '*Comptes Rendus*,' containing the abstract of my Memoir, published December 16, 1840†.

"3. Proof of Mr. Nasmyth's modified memoir, now standing in type for the forthcoming memoir.

"4 and 5. Simultaneous attacks on me in the Lancet and Gazette, founded chiefly on a comparison of the privately circulated proof, with my published memoir; such proof being made to represent the Transactions of the British Association, Vol. VIII. (!)

"6. My answer.

"The question at issue is, whether Mr. Nasmyth described at Birmingham the cellular ivory of the tooth as being the ossified pulp.

"I have marked with a marginal line the paragraphs in the Literary Gazette, and the modified proof which relate to dental development.

"Prof. Phillips has probably communicated with you on the subject. As injustice will be done to me if the Association sanction the publication of Mr. Nasmyth's views in the corrected proof, as exponents of what he enunciated in August last, it seems to be a not unreasonable request that the publication of at least that portion of his paper in question be postponed till its real correspondence with his memoir of August last be ascertained.

"He (Mr. N.) has obtained *Private Copies* of his modified memoir, and has anticipated the publication of the Society's volume, by transmitting them to the Institute at Paris and other Societies, as well as to the editors of journals, for comparison with my memoir of December.

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* On a reference made by Mr. Yates to the Reporter of the Literary Gazette, the following statement was given by that gentleman in explanation of the use of the word "verbatim."

"The Report on the Memoir on Epithelium is a 'verbatim' copy of the rough manuscript "supplied by Mr. Nasmyth. The Report on the Physiology of Teeth is fully and accurately "given in accordance with the manuscript [supplied by Mr. Nasmyth], with the exception of "those portions referring to diagrams, which would perhaps have more clearly explained the "author's views, but which, without the drawings themselves, I considered could not have "assisted the reader, and with the further exception of any errors of judgement exercised by "me, such as the above consideration may evidence." The paragraphs marked by Mr. Owen with a marginal line were in the Report on the Physiology of Teeth.

† Mr. Owen's communication to the Institute was read on the 16th December, and published in the 'Comptes Rendus' on the 23rd of December.

"Believe me, my dear Sir, faithfully yours,

"*James Yates, Esq., &c. &c.*, "RICHARD OWEN."
"*Sec. Council, British Association.*"

Mr. Yates was unfortunately absent from England when Mr. Owen's letter reached his house. Both the General Secretaries were also on the Continent, and most of the other members of the Council were absent from London, so that it was found impossible to assemble a Council to receive and consider Mr. Owen's appeal before the assembly of the members at Glasgow, at the meeting of the Association in September.

On the 10th of August Mr. Phillips informed Mr. Nasmyth in the following letter of the course he felt it his duty to follow under these novel and very embarrassing circumstances:—

"SIR, "York, August 10, 1840.

"The course of proceeding which I have thought it my duty to adopt, in regard to the publication of your paper, is this:—The printer will lose no time in finishing the volume, the abstract of your papers omitted; he will also retain in type the whole of your abstract, in the form you have given it, in order that, should the Council direct it to be introduced, it may, with as little delay as possible, be added to the volume, whether published or not, and the opinion of the Council on the case, so far as by copies of all the letters I have received, and by reference to public documents, it can be justly stated to them, will be requested on the very earliest possible occasion; this being what I conceive the line of my duty, in consequence of the appeal which Professor Owen has made to the Council (Mr. Yates and the General Secretaries being unfortunately absent). I shall be both surprised and grieved if you interpret as intended injustice to yourself what certainly is based on a conscientious desire to conduct myself rightly in circumstances such as happily have not occurred before in connexion with the British Association.

"That you should be dissatisfied with the suspension of the printing of your paper, is an almost necessary consequence; but I really cannot suppose that your displeasure at this proceeding on my part will prevent you from furnishing to the Council, through their Secretary, Mr. Yates, such of the original documents which you mention as may be sufficient to prove the accuracy of the abstract you desire to have printed. Should you, however, instead of this easy and obvious method of correcting any error of mine, resolve to appeal to another tribunal, the public, I will give you the only proof in my power to offer of an unbiassed mind, by transmitting copies of all the letters I have received from you, to render any statement you may think proper to make as complete as possible. "I am, &c. &c.

"*A. Nasmyth, Esq.*" "JOHN PHILLIPS."

To this Mr. Nasmyth replied as follows:—

"13 A, George Street, Hanover Square,
12th August, 1840.

"*To Professor John Phillips.*

"SIR,

"I have to acknowledge the receipt of yours of the 10th instant, and in reply have to state, that notwithstanding I have already fully done my duty to the British Association, it must be perfectly clear to you that I can have no possible objection to submit the documents required to you for your satisfaction. It must also be clear to you, as you of course know the circumstances, that I cannot consistently with what is due to myself place any papers, drawings, or other documents containing unpublished matter, in the way of falling under Mr. Owen's inspection, having suffered so much already in that quarter. Since I have had the papers in my possession I have continued my investigations, and the blank pages of the original papers contain much recent original matter. The books of drawings and separate sheets of drawings themselves contain the requisite illustrations of these recent researches; I could not, therefore, on that account, submit them where they would run the least risk of inspection by that gentleman; and even were there no original matter, I cannot, under the circumstances which have occurred, submit myself to any tribunal over which he has the least shadow of control. However, I in no way wish to elicit an opinion from you on these points, but I beg to say that as you are the person who ought, as editor of the Transactions of the British Association, to be satisfied of the correctness of any abstract or epitome published by you in that capacity, I will, if you choose, either show you here, or without hesitation I will even take the trouble of conveying to you at York the whole of my preparations, drawings and original manuscripts, which I had with me at Birmingham, under the express condition, however, that Mr. Owen is not allowed to see them, or in any way whatever to interfere. I must remind you, however, that all these have already been in your power, and the MSS. in your possession for some time, and that every opportunity has been rendered by me already for any one of the Council to satisfy himself on any point: the circumstances which have since occurred, and those which I have above alluded to, form sufficient grounds for not submitting any documents to the Council again* as a body, though for your satisfaction, as Editorial Secretary, I can have no hesitation in submitting them. In stating this I beg it to be distinctly understood that I mean no disrespect to the body collectively, or to its members individually.

"I only wait therefore your answer, in the hope that as you alone are now responsible for what is published, your eye alone need be satisfied, a satisfaction which was equally in your power and that of the Council for some time already, and which time was only limited by their own choice, and not by any importunity on my part to have the papers back.

"I need not observe that a great difficulty connected with the step of forwarding my original documents is the size of the illustrations, drawings, &c.; the necessity of these to elucidate the original papers (the whole being a piece of descriptive microscopic anatomy,) you may judge of by the desire I evinced to you of having some of these illustrations introduced in the abstract. That, however, shall not stand in the way of satisfying you, and prevent the necessity of a step which I should deplore as much as any one. I can assure you, Sir, that it was with the utmost reluctance I took any step at all with reference to Prof. Owen's treatment of me, but I am happy in feeling that every member of the profession with whom I am acquainted, and many besides, think that I have only done what was due to myself; and I am quite sure that any one who knows me will give me credit for a love of anything rather than disputes, especially public disputations, as my forbearance for so long a period may testify. I have laboured hard for some years in a particular line of discovery, and you would feel as strongly as any one that it is not pleasant to have the results of your own labours appropriated by another, and then the accidental position of that other on a Council of a Society where your own discoveries were first made public (upon whose protection you throw yourself) acting as a check upon the publication of an ungarbled epitome of what you had really said.

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* There is some mistake here; no documents of Mr. Nasmyth's, nor any question having any relation to them, had ever been before the Council at the time that this letter was written.

"Such is my case, and I leave it in your hands. I am very happy to know that it is by Prof. Owen's instigations that this act of justice is denied me. But I hope by the course I have proposed in this letter to induce you, as the organ of the Association, not to commit an act of injustice which one interested member of its Council would induce it to commit.

"I shall be ready either to go to York to communicate with you, or to see you here. I need not inform you of the very great inconvenience it will be to me to leave town even for a day at present, and it would be of much consequence to me if it could be spared.

"I remain, Sir, your very obedient servant,
"ALEXANDER NASMYTH."

It may be proper here to remark, that when Mr. Nasmyth wrote this letter, Mr. Owen was himself a member of the Council: he ceased to be so in the new Council appointed at Glasgow*; and he was not present at the only meeting of the former Council, in which the question of Mr. Nasmyth's paper came under consideration, namely, in September.

Mr. Nasmyth's offer to convey his original memoir to York, for Mr. Phillips's satisfaction, was declined, as, an appeal having been made to the Council, the case was removed out of his jurisdiction.

On the 5th of September Mr. Nasmyth enclosed to Mr. Yates the following letter, to be laid before the Council at the same time with Mr. Owen's appeal:—

"*To the Council of the British Association.*

"13 A, George Street, Hanover Square,
5th Sept., 1840.

"GENTLEMEN,

"Professor Phillips, the Assistant Secretary to the British Association, having, on a simple application from Mr. Owen, without any authority or investigation on the subject, although I repeatedly offered him all the means and facilities in my power, and even offered to take all the materials and papers connected with my communications to York for his individual satisfaction, at once suppressed, in the volume of the Transactions of the past year, the whole of a report of three contributions made by me on three different subjects to the last meeting of the British Association; though one of these had not the slightest connexion with the point in which Mr. Owen's application originated; though all of them had been approved by the Council†, read and demonstrated at the public meetings of its Sections, and the original papers themselves had remained in the hands of its officers, and been 'reported' under the direction of Professor Phillips; and though the abstract, made out at his request, had been, after his inspection, condensed and shortened at his especial suggestion, gladly inserted by him, corrected in proof under his superintendence, and printed, and communicated to me in a separate form with his authorization;—I now respectfully demand from you the restoration of my abstract to its proper place in all the copies of the Transactions hereafter circulated, and that an apology for its omission be instantly circulated and sent to the possessors of the volumes hitherto sold. If Professor Phillips has any cause of complaint against me, I shall instantly be ready to defend myself, if common fairnesss is first shown me, and my privileges restored; but I protest against his having first, without even the distinct allegation of a relevant deviation from propriety on my part, and certainly without an attempt on his part to try the validity of any justification, taken extreme measures against me, and then, in fact, arbitrarily passed and executed sentence upon me before trial, or even a relevant or distinct charge. Such a line of conduct in my opinion savours of persecution, and is certainly at direct variance with British ideas of justice, and I am confident that the British Association for the Advancement and Encouragement of Science will never sanction for an instant such a total subversion of the fundamental bond of union of the Association.

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* Having been on the Councils of 1838 and 1839.

† Mr. Nasmyth was in error in supposing that either his original memoirs or his abstract had ever been seen by the Council.

"I am, Gentlemen, your obedient servant,
(Signed) "Alexander Nasmyth."

In September the volume of the Transactions was published, containing in its sectional notices, the title of Mr. Nasmyth's papers read at the Birmingham Meeting, but, as in the case of many other papers in that volume, and in others, without any abstract being given of their contents.

On the 15th of September, being the earliest day on which the Council could be assembled, they met at Glasgow, having before them the letters above noticed, and a statement from Mr. Phillips that he had never seen either of the two papers read by Mr. Nasmyth to the Medical Section. Whereupon the following Resolutions were adopted:—

1. That the Council approve of the decision of Mr. Phillips to suspend the publication of Mr. Nasmyth's paper, pending an appeal to the Council from Professor Owen, relative to the correctness of Mr. Nasmyth's report of that paper.
2. That it be referred to the President and other officers of the Medical Section at Birmingham, to decide whether the report of Mr. Nasmyth's paper, as published in the Literary Gazette and Athenæum, or in either of those periodicals, or the report of that paper sent by Mr. Nasmyth to Mr. Phillips for publication in the 'Report of the Ninth Meeting of the Association held at Birmingham,' is more correct in regard to the points under discussion between Professor Owen and Mr. Nasmyth, and that the President of the Medical Section be requested to communicate the result to the Council at his earliest convenience.
3. That these Resolutions be communicated to Professor Owen and Mr. Nasmyth.

On the 19th of November the Report of the Referees was received by the Council: it was as follows:—

Reference having been made to us by a Council of the British Association for our opinion whether the report of Mr. Nasmyth's paper, as published in the Literary Gazette and Athenæum, or in either of those two periodicals, or the report of that paper sent by Mr. Nasmyth to Mr. Phillips for publication in the Report of the Ninth Meeting of the Association, held at Birmingham, is more correct with regard to the points under discussion between Professor Owen and Mr. Nasmyth, we have carefully examined these several documents, and it appears to us that the main point under discussion between these two gentlemen is, whether the account of the process of dentition, contained in Mr. Nasmyth's paper, did or did not comprise the theory that the ivory of the teeth is formed by the ossification of the pulp. We find, with reference to this question, that in the accounts of Mr. Nasmyth's paper, given in the Literary Gazette and Athenæum, his opinions on that subject are involved in considerable ambiguity; for, while some passages in them would imply that he considered the proper substance of the teeth as being formed by the addition of ossific matter in the original structure of the pulp, commencing and proceeding on its surface, these reports contain, at the same time, other passages, in which the theory of the ossification of the pulp is distinctly and expressly disclaimed by Mr. Nasmyth; whereas in the abstract of his paper, drawn up by himself, with a view to publication in the Report of the Association, this theory is very explicitly and unequivocally maintained. Whether this theory was distinctly advanced in the original paper read to the Medical Section at Birmingham, it is not in our power to determine, because that paper is not before us, and because we have no other evidence of the nature of its contents than the printed documents already referred to.

(Signed) JAMES MACARTNEY,
One of the Vice-Presidents of the Medical Section at the Birmingham Meeting.

P. M. ROGET,
One of the Vice-Presidents of the Medical Section at the Birmingham Meeting.

G. O. REES,
One of the Secretaries of the Medical Section at the Meeting at Birmingham.

November 16th, 1840.

This Report having been considered, the Council resolved,—

1. That the Council do not consider it necessary to make any further publication of Mr. Nasmyth's communication than the notice inserted in the Report of the Ninth Meeting of the Association, held at Birmingham.
2. That this Resolution be communicated to Mr. Nasmyth and Professor Owen.
3. That the thanks of the Council be returned to the Authors of the above Report, for the care and attention which they have employed in preparing it, and that they be furnished with a copy of the preceding Resolutions.

On the 8th of January 1841, the Council received, through their Secretary Mr. Yates, a communication from Mr. Nasmyth, dated January 7th, still pressing the publication of his abstract in the volume of the Association Reports, and expressing his readiness and desire to lay before the Council the engravings from the drawings which had accompanied his papers read at Birmingham. There appeared from this communication reason to suppose that Mr. Nasmyth might no longer entertain the indisposition expressed in his letter to Mr. Phillips of the 12th of August, to allow the Council to have the original memoirs for the purpose of comparison with the abstract; and as by this comparison alone their agreement or disagreement with each other could be ascertained, and the Council be enabled (on the supposition of their agreement) to publish Mr. Nasmyth's abstract with their own authentication, the following Resolution was adopted:—

"That Mr. Yates be requested to obtain from Mr. Nasmyth the original memoir or memoirs read by him to the Medical Section at Birmingham, with a statement that no alterations have been made in them; and to refer them to the authors of the Report to the Council, dated November 16, 1840, for the purpose of enabling them to decide upon the correctness of the abstract presented by Mr. Nasmyth for publication in the Report of the Ninth Meeting of the Association held at Birmingham; and that the Referees be requested to report the result of their inquiries to the Council at their earliest convenience."

At a meeting of the Council on the 27th of February, the following letter was presented from Dr. Roget, addressed to Mr. Yates, Secretary of the Council:—

"Dear Sir, "Bernard Street, January 21, 1841.

"Dr. Rees and myself, having taken into our consideration the letter which you wrote to both of us the day before yesterday, beg, in answer, to refer you to the letter of Dr. Macartney, of the 12th instant, addressed to yourself (which we return inclosed), and to express our entire concurrence in the opinion he there gives on the subject of the new reference made to us by the Council of the British Association. The question at issue between Mr. Nasmyth and Mr. Owen being one of considerable delicacy, we have thought it right to protect ourselves from all suspicion of being biassed in our judgement by *ex parte* statements or representations; and we have accordingly scrupulously avoided having any communication with Mr. Owen, either directly or indirectly, on the matters in dispute. For the same reason we must decline the proffered interview with Mr. Nasmyth, and the more so as we feel that the question, on which the Council request our opinion, would become more involved and difficult of solution by the introduction of matters really foreign to it, which would unavoidably result from such an interview. The simple question, as it appears to us, turns upon the matter contained in the original memoirs, in the identical state in which they were read to the Sections of the Association at Birmingham. Mr. Nasmyth having subsequently made many additions and alterations in these manuscripts, and not having consented to restore them to their former state, as proposed by Dr. Macartney, and having declined to place in the hands of the Referees the original memoirs, as desired by the Council, we are consequently unable to execute the task they have requested us to undertake.

"Dear Sir, faithfully yours,
"*Rev. James Yates.*" (Signed) "P. M. Roget."

Dr. Macartney's proposal referred to by Dr. Roget, contained in his letter of the 12th of January to Mr. Yates, was as follows:—

"If any reference be made to the officers of the Medical Section, the best thing Mr. Nasmyth can do is to efface all the additions and interlineations made in the original paper (having first taken a copy of them for his own use). It could neither be desirable to him, nor to the Referees, that any new or unpublished matter should be exposed, nor can such exposure throw any light on the subject. I, for my part, shall beg to decline the reference if any writing be submitted to me, except what Mr. Nasmyth can assert existed in the paper when read to the Medical Section."

The Council then adopted the following Resolution, and requested Mr. Yates to communicate it to Mr. Nasmyth:—

"The Council having at a former meeting taken Mr. Nasmyth's application into consideration, and having referred the question to the authors of the report to the Council, dated November 16, 1840, who have been unable to give an answer on the points referred to, regret that they feel themselves incompetent to take any further step in the case*."

The members of the Council having received a printed communication from Mr. Nasmyth, dated 20th of March, 1841, addressed to themselves, a meeting of the Council was held on the 29th of March, and the following Resolution adopted:—

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* In a printed communication from Mr. Nasmyth to the Council, dated 20th of March, 1841, in which this resolution is quoted, the words "*regret that they,*" are omitted in the quotation. These words were, and still are, in the original minute which Mr. Yates was desired to communicate to Mr. Nasmyth, and were accidentally omitted by Mr. Yates in transmitting the Resolution to Mr. Nasmyth.

" The Council having for the first time had submitted to them a copy of a " document, (being a note at page 3 of a printed letter, dated March 20, " 1841, signed ' Alexander Nasmyth,' and addressed to the members of the " Council of the British Association,) which document they have reason to " believe has not been seen by the Committee, together with other evidence " which they conceive to be new, and to bear upon the subject matter of the in- " quiry referred to them on the 15th of September, 1840, request the renewed " assistance of the Committee on this difficult question; and as the above new " document purports to have proceeded from the Geological Section, the " Council would request the President and Vice-Presidents of that Section to " assist the Committee in forming their judgement and making their report."

The Council requested Mr. Yates to acquaint Mr. Nasmyth of this resolution; and as it appeared from his printed letter that he entertained some erroneous views with regard to the conduct and proceedings of the Council, they also directed Mr. Yates to afford him such explanations in reply as they hoped might remove his misconceptions; and further, to state expressly, that if they were put in possession of a copy of the original memoirs, duly authenticated, they might find it proper to publish an abstract of them in a future volume; this was accordingly done in a letter to Mr. Nasmyth, read and approved by the Council.

On the 28th of May the Council assembled to receive the report of the Committee appointed by the preceding resolution (of the 29th March). After a recapitulation of the proceedings on the two former occasions, the Report proceeded as follows: viz.—

" The Council have since thought proper to request the same Committee, to whom they have added the President* and Vice Presidents† of the Geological Section of the Association at Birmingham, to inquire into the authority supposed to be given to Mr. Nasmyth's abstract by a printed document, in the shape of a printer's revise, purporting to be the report, by the Editorial Secretary, of another paper of Mr. Nasmyth's read to the Geological Section, at the same meeting of the Association, which revise, he alleges, contains the following passage, viz, '*the ivory is neither more nor less than the ossified pulp*,' and on which he founds an argument that an affirmation to that effect had been distinctly made by himself in that paper.

" The present Committee, to whom this question has been specially referred, have procured, through the kindness of Colonel Sabine, one of the General Secretaries, a certified copy‡ of the original manuscript report referred to by Mr. Nasmyth, and which it appears was drawn up immediately after the paper had been received, by Dr. Lloyd, one of the Secretaries of the Geological Section. It is as follows:"

(It is the subjoined document marked B.)

" On comparing this manuscript copy with the printed revise, as quoted by Mr. Nasmyth at p. 3 of his printed letter to the Council, it appears that several alterations have been made in the original in its progress to that stage of revision in which Mr. Nasmyth now produces it; and in particular, that the expression quoted by him in italics, as especially corroborating the fidelity of his abstract, *is not contained in it.*

" Your Committee then agreed to send the following communication to Mr. Nasmyth through their Secretary:—

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* Dr. Buckland. † Leonard Horner, Esq., Charles Lyell, Esq.

‡ A copy, certified by Dr. Lloyd, of the rough copy preserved by himself of the original manuscript.

" 'Royal Society's Apartments, May 5th, 1841.

" 'The Secretary of the Committee appointed by the Council of the British Association, on the 29th March 1841,—to inquire into the authority alleged to have been given to the report furnished by Mr. Nasmyth to the Secretary of the British Association by a printed revise, purporting to be the report of the Editorial Secretary of a paper of Mr. Nasmyth's, read to the Geological Section at the meeting of the British Association at Birmingham,—is instructed by the Committee to request Mr. Nasmyth to bring or send the original paper which he read at the Geological Section at Birmingham, to the Committee, at their next meeting, to be held at the Apartments of the Royal Society, at half past four o'clock, on Saturday, the 8th of May, under cover, addressed to the Chairman of the Committee of the British Association, Royal Society, Somerset House.'

" Your Committee again met for the purpose of receiving Mr. Nasmyth's answer, and found the following letter, addressed to the Chairman, had been sent to the Royal Society :—

" '13 A, George Street, Hanover Square, 7th May, 1841.

" 'Mr. Nasmyth begs to acknowledge the receipt of a communication, dated May 5th, from the Secretary of a Committee appointed by the Council of the British Association, on the 29th March 1841, to inquire into the authority alleged to have been given to the report furnished by Mr. Nasmyth to the Secretary of the British Association by a printed revise purporting to be the report of the Editorial Secretary of a paper of Mr. Nasmyth's, &c. Mr. Nasmyth begs positively to state that he had nothing whatever to do with the drawing up of the above-mentioned printed revise, and he takes this opportunity of distinctly repeating, that it does not merely 'purport' to be the report of the Editorial Secretary, but must actually be considered as such, having been sent to him by that gentleman precisely in the state in which it at present exists in his possession.

" 'The evidence in Mr. Nasmyth's hands, respecting the origin of this report, he has already submitted to the Secretary of the Council*, as well as all his original communications. In respect to the latter he begs to refer the Committee to two letters in Mr. Yates's possession; the one in print, dated the 17th April, addressed by Mr. Nasmyth to the Members of the Council of the British Association; the other in manuscript, dated 27th April, and addressed to Mr. Yates himself.

" 'Mr. Nasmyth is pleased to find that the question at issue, between the Council and himself, is so distinctly defined in the note to which he is at present replying; and in order that this matter may now at once be set at rest, will the Committee have the goodness, as soon as possible, to forward to Mr. Nasmyth the assurance that so soon as satisfactory proof shall have been submitted to it, that the 'printed revise' of the report in question emanated from the officer of the British Association, satisfaction shall also be immediately afforded to him by the restoration of his own report to the printed Transactions of the Association?'

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* The printed revise in question was stated by Mr. Nasmyth to Mr. Yates to have been received by him in an envelope, produced for Mr. Yates's inspection; it bore the London post mark of the 2nd of April, 1840; was directed to Mr. Nasmyth in the hand-writing of the foreman of Mr. Taylor's printing establishment, and contained the following printed sentence:—" Professor Philips will be obliged by the immediate return of this proof to Messrs. R. and J. E. Taylor, Red Lion Court." From the date of the post mark it may be inferred that the inclosure contained in the envelope was the printed abstract of Mr. Nasmyth's geological paper referred to in his letter to Mr. Phillips of the same date (page 2). The "proof," which must have preceded the "revise" in Mr. Nasmyth's possession, has been sought in vain, as well as the manuscript from which it had been printed.

"Addressed, by desire, to the Chairman of the Committee of the British Association, Royal Society, Somerset House.

"Mr. Nasmyth having thus made no reply to their request to be allowed to see his original paper, your Committee cannot proceed further in the inquiry.

(Signed) "LEONARD HORNER, Chairman."

The Council having failed in their frequently repeated endeavours to obtain Mr. Nasmyth's original papers, or assured copies of them, for the purpose of comparison with Mr. Nasmyth's abstract, are unable, on the one hand, to publish the latter, authenticated as a faithful report of the papers read by that gentleman at the meeting at Birmingham, or, on the other hand, to decide that it is not a faithful report of those papers. They conceive that when due consideration is given to the caution proper to be exercised in sanctioning the publication of papers in a case of disputed claim as to priority of discovery;—and when it is remembered that Mr. Nasmyth's abstract, however correct it may be, was not drawn up until several months after his papers were read;—and that in the interim the discovery which he claims for himself was communicated as an original discovery by Mr. Owen to the French Institute, and published as such;—the propriety of requiring the original documents, or assured copies of them, for the purpose of authenticating the abstract, will be universally assented to.

The Council would nevertheless feel great regret, that any man of science who had favoured the Association with the communication of his researches, should think that he had reason to be dissatisfied with the way in which they were received; and as Mr. Nasmyth, while withholding the original papers, which are his undoubted property, still presses the publication of his abstract in the volumes of the Association Reports; and as the Council willingly admit that it was furnished in strict compliance (presuming its fidelity) with the request of the Assistant General Secretary, under whose superintendence the volumes are published; they have decided on complying with his request for its insertion in the present volume, though they are unable to pronounce on its fidelity. They consider it right to publish at the same time that contemporaneous report of Mr. Nasmyth's two papers read before the Medical Section, which was furnished by himself to the Editor of the Athenæum Journal, and which is now reprinted from the original manuscripts so furnished by Mr. Nasmyth, preserved by the Editor of the Athenæum, and placed by him at the disposal of the Council. To these they have added Dr. Lloyd's contemporaneous abstract of Mr. Nasmyth's paper, read to the Geological Section, which may indeed be considered to have the best claim of the three for insertion in the volumes of the Association, having been furnished, in strict conformity with the rules, by the official organ of the Geological Section. The members of the Association who take an interest in this branch of Physiological research, and wish to know what Mr. Nasmyth communicated to the meeting at Birmingham, will thus have before them the best information which it has been in the power of the Council to procure.

The Council have also thought it right to prefix to these documents a concise and continuous relation of their proceedings, which they now draw to a close, in a case of considerable delicacy and difficulty, the only one of its kind which has occurred in the history of the Association; and they hope that by an adherence to the regulations which now prescribe the early publication of the annual volume, and by an observance of the caution inserted in the circular sent to members preparatory to the meetings, to the effect that—authors of communications to the Sections will be expected, before the close of the meeting, to present concise and careful abstracts to the Secretaries of the

Sections, before which their papers have been read,—the repetition of similar cases in future will be effectually prevented.

SUBJOINED DOCUMENTS.

(A.)—*Reports of Mr.* Nasmyth's *two papers read before the Medical Section at Birmingham, furnished by himself to the Editor of the Athenæum Journal, and printed in No.* 620, *page* 707. *Sept.* 14*th*, 1839. *Reprinted from the Original Manuscripts, and showing the differences between the Manuscripts and the Reports as they appeared in the Athenæum.*

Mr. Nasmyth read a paper "On the Microscopic Structure of the Teeth," in which he treated also of the covering of the enamel and of the organization of the pulp. He first stated that his researches had led him to a conviction contrary to that of Retzius, Purkinje, and Fränkel, for he had found that the enamel in all cases possesses a distinct envelope or coating. On the incisor of the calf, and on several other simple teeth, he had also traced in it the corpuscles of Purkinje, analogous to those found in bone**. With respect to the microscopic structure of the teeth, Mr. Nasmyth treated principally of the interfibrous substance, which he said was not "structureless," as has been erroneously stated, but decidedly cellular. The fibres themselves he described as presenting an interrupted or baccated appearance, as if made up of compartments, which differ in size and relative position in various series of animals. He detailed their peculiarities in the human subject, in some species of the monkey tribe, and in the oran outan. After the earthy matter of teeth has been removed by acid, the animal residue, he stated, consists of solid fibres, and if the decomposition be allowed to continue, these fibres present a peculiar baccated appearance. The general appearance of the fibres treated by acid is similar to that of the fibres of cellular tissue generally, and the diameter of each corresponds exactly to the calibre of the dental tube, as described by Retzius, and which, according to that writer, is pervious, although at the same time he says that it is always more or less filled with contents of an earthy nature. With regard to the internal structure of the pulp, Mr. Nasmyth stated that the number of minute cells presenting themselves in its interior, in a vesicular form, is very remarkable. They vary in size from the ten-thousandth to one-eighth of an inch in diameter, and are evidently disposed in layers. The parenchyma of macerated pulp is found to be traversed by vessels, and to be interspersed with granules. The arrangement of these cells or vessels, Mr. Nasmyth thinks, may account for the shrinking or nearly total disappearance of the pulp which he has frequently observed: their use in the œconomy of the part he has not yet ascertained. They are evidently filled either with air or fluid. He finds that they [constantly]† exist on the formative surface of the pulp. Mr. Nasmyth [now]† *next** proceeded to the [most difficult department of the subject—to that which former inquirers have either evaded or treated very incompletely, viz. the]† nature of the process by which the ivory is developed. The formative surface of the pulp, which is in apposition to the ivory, and by which the latter is produced, he described as presenting a general cellular arrangement, which he denominated reticular, resembling a series of skeletons of a desiccated leaf. This reticularity is found to have peculiar diversities in different classes of animals. Mr. Nasmyth has

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** A full description of this structure [may]† *will** be found in a paper by Mr. Nasmyth, in the forthcoming volume of the Transactions of the Medico-Chirurgical Society, accompanied by drawings.

* The words in italics are in the Athenæum, but are not in the original manuscript.

† The words in brackets are in the original manuscript, but are not in the Athenæum.

found that a similar appearance is presented by the capsule and by the capsular investment of the enamel. The leaves or compartments of the reticulation are surrounded by a well-defined scolloped border, from which occasionally processes are observed to arise at regular intervals. With respect to [the actual process of]† the formation of the ivory, Mr. Nasmyth [candidly avowed]† *stated** that he was not prepared with a [perfectly]† satisfactory theory, [but could]† *and would** only submit a few observations based on his own researches. On the surface of the pulp, he said, are found innumerable detached cells, with central points, which latter are at regular intervals corresponding in extent to those existing between the fibres of the tooth. The cellules of the fragments of the ivory which are found scattered on the pulp resemble exactly in size and appearance the cellules of the latter when in a state of transition. Mr. Nasmyth is of opinion, that from the spirally fibrous frame work of the reticulations are evolved the spiral fibres of the tooth. The diameters of the two sets of fibres exactly agree. The projections on the formative surface of the pulp correspond to the centres of the cells, may be traced to belong to their structure, and are evidently fibres passing upwards from the pulp. Mr. Nasmyth has also ascertained that the fibres of perfect ivory resolve themselves by decomposition into similar granules. He has not discovered the manner in which the osseous matter is deposited in the cells of the interfibrous substance, but he has observed that these cells are subdivided into minute cellules, for they present the appearance of being filled with smaller cells in certain progressive stages of development. But in whatever aspect, said he, we view the formative organs of the tooth and the dental tissues themselves, and whether we examine the latter during the process of their developement or after their formation has been completed, we are everywhere met by appearances which denote a cellular or reticular arrangement. Mr. Nasmyth concluded his paper by a notice of Schwann's [recent]† work on the cellular character of primary tissues, dwelling [more particularly]† on his views of the cellular organization of the pulp, from which [as he showed]† his own were essentially different.

Mr. Nasmyth read a paper "On the Structure of the Epithelium," which he described as being composed of cells. He first alluded to the views of Leeuwenhoek on the subject, contained in letters to the Royal Society, written in 1674 and in 1684–5, and according to which this tissue is composed of scales. The researches of subsequent inquirers tend to prove that scales or cells of various forms exist on the surface of all mucous and serous membranes, on the inner membrane of the vascular system, &c. Mr. Nasmyth described the epithelium as a layer of substance destitute of vessels, covering the vascular surface of mucous membranes. The scales, as they were first termed by Leeuwenhoek, of which it is composed, are flat bodies, with a thick portion or nucleus in their centre, and with very thin and transparent margins, which are sometimes curved: their surface often presents numerous transparent points, with very fine lines. The nucleus of the scale generally contains a small body, which has been called the nucleus-corpuscle. If the secretion be removed from an irritated mucous membrane, these bodies are found to assume the appearance of cells; but generally at the surface they resemble scales, from having increased in size and undergone compression. In the fœtus the well-defined scales of the epidermis are not unfrequently seen externally; the *rete Malpighii* consists of newly-formed cells, and between the two may be observed other cells in a state of progressive development. In the epithelium generally, a nucleus is first [found]† *formed**, and then a cell is formed around it. These cells are connected by a gelatinous substance, interspersed with minute granular bodies, which displays considerable elasticity, and which sometimes presents a fibrous appearance. The granules can be caused to disappear by compression. In certain parts of the epithelium of the calf, distinct fibres are observed to pass over the surface of the scales, and to connect them together, thus forming a very delicate net-work. On the surface of the body and of the mucous membranes of man and animals generally, the superficial scales are thrown off by pressure from the cells beneath. But in some cases, as with frogs and efts, the epithelium-scales are removed in a continuous layer, and Mr. Nasymth is disposed to believe that it is the covering which, according to naturalists, is swallowed by the animal after having been shed. The cuticle and epithelium then are evidently organized [tissues]† *bodies**. It would appear that they are formed from a fluid secretion, and that their various stages of development are as follows: 1st, the formation of nuclei and their corpuscles; 2nd, that of cells; 3rd, the growth of the latter effected by vital imbibition; 4th, their compression and gradual conversion into minute lamellæ or scales. The cells seem to have within themselves a power of growth, and it remains for pathologists to determine what share the derangement of this function has in the production of cutaneous diseases. Under certain modifications the epithelium certainly presents vital phænomena, among which may be mentioned the ciliary motions. Mr. Nasmyth concluded his paper by an especial description of the portion of the epithelium lining the cavity of the mouth. In the fœtal subject, previous to the extrusion of the teeth, it forms on the alveolar arch a dense projecting layer, distinguishable from the surrounding membrane by its whiteness, and by superficial and waving ridges and sulci. The younger the subject, the greater is its thickness. It is made up of a mass of scales lying one above the other, and thus presents no resemblance to cartilage, though it has been generally classed as such. In the interior of its structure, where it corresponds to the molar teeth, small vesicles may be frequently observed, varying in size from one-fourth to one-eighth of a line in diameter. On microscopic examination, the [parietes]† *particles** of these are found to consist of attenuated scales, and their cavity to contain a fluid abounding in minute granules and cells. They are probably the "glands" described by Serres as intended for the secretion of the tartar. Larger vesicles are also found implanted in the vascular mucous membrane, composed of a very delicate tissue, and containing a transparent fluid, which coagulates on the application of heat or acid. In this fluid float numerous globules and scales, similar to those of the epithelium generally. The internal or attached surface of the alveolar epithelium presents numerous fringed processes, which sink into the substance of the subjacent mucous membrane. These are found to be composed of elongated scales. By immersion in water or diluted spirits of wine, these fringes are much enlarged, and their size, indeed, exceeds that of the dense epithelium itself.

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* The words in italics are in the Athenæum, but are not in the original manuscript.

† The words in brackets are in the original manuscript, but are not in the Athenæum.

(B.)—*Dr. Lloyd's Abstract of Mr. Nasmyth's Paper read before the Geological Section at Birmingham; printed from a copy preserved by Dr. Lloyd.*

" During the author's microscopic researches on the structure of teeth, he was led to the discovery of the organized nature of the interfibrous substance which Purkinje, Fränkel, Retzius, and Müller have regarded as structureless, and which he is disposed to believe is so characteristic in different animals as to be capable of affording valuable aid in the classification of the animal kingdom. This structure he first observed in a section of a fossil tooth of a rhinoceros, by the aid of a magnifying power of one-tenth of an inch focal distance, with an achromatic condenser of the light. The section presented an appearance of cells or compartments, the form of the cells varying in different animals; the structure also of the fibres of different teeth presenting an interrupted or baccated appearance; the size and relative position of these divisions of a fibre differing in various series of animals. In man, each division is of an oval form, and connected [by] their longer axes, which correspond with the course of the fibre. In some species of quadrumana, the fibre appears to consist of two parallel rows of compartments. In the orang outang, the form is rhomboidal; and in the baboon, they are oval, as in man. The laminated concentric structure of the tusk of the mammoth, the strength of ivory when cut parallel to the long axis of the tusk, and its weakness if cut at right angles, are urged in corroboration of this peculiar structure. The structure of the enamel, as seen in a section parallel to the long axis of a tooth, presents compartments of a semicircular form; the convexity of the semicircle looks upwards towards the free external portion of the tooth. The chemical composition of the enamel has hitherto led to the conclusion of there being only a small portion of animal matter in enamel. From Dr. Thomson's recent analysis it appears that this has been much understated. The pulp is observed to be cellular throughout its internal structure, and this structure is essentially concerned in the development of the ivory, in the production [of] both [the] fibres as well as of the interfibrous substance. There exists a great analogy between the internal or productive surface of the capsule and the external or productive surface of the pulp. The membranous investment of the enamel in human teeth, lately discovered by the author, displays a similar arrangement. The crusta petrosa is provided with a membranous investment.

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* The words in italics are in the Athenæum, but are not in the original manuscript.

† The words in brackets are in the original manuscript, but are not in the Athenæum.

" The above is a correct copy of my rough copy.

(Signed) " G. Lloyd*."

(C.)—*Mr. Nasmyth's Abstract of the Three Papers, sent to Mr. Phillips on the 24th February* 1840, *abbreviated at Mr. Phillips's suggestion, and finally corrected by Mr. Nasmyth in its progress through the Press in May* 1840. *The italics are Mr. Nasmyth's.*

1. *The Capsular Investment of the Enamel.*—The *Crusta Petrosa,* said Mr. Nasmyth, had been described after Retzius, Purkinje and Fränkel, as a layer external to the ivory of the fangs of the simple and compound teeth of man, and mammalia generally, but as not present in the simple teeth, as a covering to the enamel. Now this latter position he not only controverted, but maintained, in direct opposition to it, *that the enamel itself possesses in all instances a distinct envelope or coating.* On the incisors and other simple teeth of many animals he had succeeded in tracing, in this envelope, the corpuscles of Purkinje, analogous to those found in bone†.

2. Mr. Nasmyth next passed to the consideration of the *interfibrous substance of the ivory.* Purkinje and Fränkel had stated that " the proper den-

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* The words within brackets are noticed by Dr. Lloyd as having been accidentally omitted in his original manuscript, and were since supplied by him as being necessary for the sense.

† In the 8th Vol. of the Med. and Chir. Transactions is a paper by Mr. Nasmyth containing a full account of his discovery of the Capsular Investment of the Enamel.

tal substance consists of a uniform structureless substance, and of fibres passing through it." Retzius, Müller and others leave us to conclude that the interfibrous substance does not present any traces of peculiar conformation. Here again he was at issue with these authorities; for he believed, and hoped he could demonstrate, both by preparations and diagrams (a great and interesting variety of which were exhibited to the Meeting), that the interfibrous substance of the ivory was not only organized, but *peculiarly and characteristically organized in different animals,* so as to be capable of affording valuable aid to the naturalist in classifying the animal kingdom. In short it was *cellular*: this he had first learnt in examining a delicate section of the fossil tooth of a Rhinoceros; afterwards he had found the same appearances in recent teeth; and subsequently in all the specimens which he had examined.

3. Mr. Nasmyth had examined the *fibres* of different teeth, and had generally found that they presented *an interrupted or baccated appearance,* as if they were made up of different compartments. The size and relative positions of the portions or divisions of a fibre differ in various series of animals. In the human subject, each compartment is of an oval shape, and its long small extremity is in apposition to the one next adjoining. The long axis of the oval corresponds to the course of the fibre. In some species of the monkey tribe, the fibre appears to be composed of two rows of compartments parallel to each other, and a trace of the same appearance is evident even in some of the principal ramifications of the fibres. (Diagrams exhibiting the peculiarities of the fibres in the human subject, the Oran-outan, the Baboon, &c., were laid before the Meeting.)

After teeth have been submitted to the action of acid, the animal residue will be found to consist of fibres in which the baccated conformation just described can at once be seen. Mr. Nasmyth here displayed numerous diagrams, showing the cells and fibres of the ivory in different stages of decomposition by acid. The diameter of the fibres he had found to correspond exactly to that of the diameter of the calibre of the tubes described by Retzius. He had decomposed the ivory in a solution of caustic potash, but had not gathered any new results from this experiment, owing to the brittle nature of the residue, the difficulty of washing it without breaking down the structure, &c.; but still the appearances displayed in this process of decomposition were such as decidedly to authorize the position, that the ivory consists exclusively of layers of cells.

4. Mr. Nasmyth stated, that having convinced himself of the peculiar cellular structure of the ivory, he had engaged, with additional interest, in the examination of the pulp, the organ by which the ivory is produced. Its external surface, he said, presented a remarkable number of minute cells, in a vesicular form, which are found on further inquiry to form the principal portion of the bulk of the pulp. The surface, moreover, has a peculiar reticular conformation (described in section 5.). The size of the vesicles of the pulp varies from probably a diameter of $\frac{1}{10000}$th part of an inch to $\frac{1}{8}$th of an inch. They are disposed in layers, and are of various shapes. Layers of macerated pulp are found to be irregular, reticulated, and interspersed with granules. Vessels in a direction which is generally vertical traverse the parenchyma. Mr. Nasmyth had frequently been struck with the rapid and frequent diminution in the substance of the pulp, which sometimes occurs. There are even cases in which it would seem to be almost annihilated, and this takes place more frequently in adult than in temporary, in otherwise healthy than in diseased teeth. Mr. Nasmyth thought this phænomenon might be accounted for by a peculiar collapse in the congeries of cells com-

posing the pulp. The contents of the cells are evidently air or fluid; but they are so extremely minute, that he had not yet been able to ascertain which. But the main feature of his position, viz. that the pulp consists throughout of vesicles or cellules, and that these exist equally in the compartments of its reticulated surface (which he should immediately proceed to describe), his researches, he apprehended, had placed beyond the reach of doubt.

5. With respect to that difficult subject, hitherto so unsatisfactorily elucidated by anatomists, *the production of the ivory* itself, Mr. Nasmyth confessed that he had long devoted himself to its examination without much success, and that even now he was far from regarding his researches as complete or decisive. The formative surface of the pulp had first engaged his attention; this he had found to present a regular cellular arrangement, which he had denominated reticular, and which may be described, he said, as resembling the skeletons of desiccated leaves. (Of this structure, both in its general appearance, its individual parts, and its particular varieties, Mr. Nasmyth exhibited numerous drawings and diagrams to the Members of the Association.) The general compartments of the reticulation are oval, and overlap each other; when insulated, their structure is seen to be curious and regular. He had first found them on the pulp of the human tooth, and afterwards on that of all other animals which he had had an opportunity of examining. The leaves of the reticulation are surrounded by a well-defined scolloped border, on which processes are occasionally observed at regular intervals. He had extended his observations to the capsule, and had found, on its formative surface, a similar reticular arrangement. Mr. Nasmyth now approached the question as to how the vesicular or cellular pulp, with its reticular and imbricated surface, was concerned in the production of the ivory. He was aware of the impossibility at present of completely describing this process, which anatomists hitherto had for the most part eluded or passed cursorily over, and should confine himself to a few facts which he had established, and which he hoped would throw some light on the subject. In the young tooth, he said, at the period of the formation of the first layer of ivory, there are found on the surface of the pulp innumerable detached cells with central points. These cells frequently form a regular and complete coating, studded with points which are placed at intervals, corresponding in extent, as it appeared to him, to those between the fibres of the adult tooth. He exhibited diagrams of layers of these cells in different stages of their transition into ivory. The points are rendered visible from the greater opacity of the intermediate material, and will be seen to absorb or reflect the light according to the difference in the focal distance. A comparison of the superincumbent perfect ivory, with the surface of the pulp beneath, is always easy (at any rate at an early stage), because portions of the former remain adherent to the latter, and fragments of the dental bone are found strewn over it, especially in human teeth. The cellular conformation of these fragments is always evident, and in size and appearance they are perfectly in accordance with the cells of the pulp. *He concluded therefore, that the ivory is neither more nor less than the ossified pulp, and that it can in no wise be regarded as an unorganized body.* That the ossification is effected by means of a peculiar arrangement of minute cellules, seems to be evident from the constant presence of granules in the body of the pulp, and on its surface; and from the subdivided appearance of the cells, when in a state of transition into perfect ivory. As almost all preceding writers had, he believed, uniformly described the ivory as a secretion from the pulp, he wished particularly to insist upon its being an organic deposition of ossific matter in

the pre-existing cells of the pulp. (Here diagrams of different layers of cells in various stages of ossific transition were exhibited to the Meeting.) The *fibres of the tooth*, as it appeared to Mr. Nasmyth, are *derived from the framework of the reticulations*: at any rate, the fibres bounding the reticulations are precisely analogous in diameter and direction to the subsequent fibres of the tooth. He exhibited diagrams also in confirmation of this view*.

6. The *laminated cellularity of the ivory*, which Mr. Nasmyth had shown was a natural consequence of the cellular structure of the pulp, was also borne out, he thought, by facts coming under daily observation, or recorded by scientific inquirers, which could not be explained by any other theory; viz. by the evidently laminated and concentric structure of the teeth of the mammoth, which is rendered directly evident during their decomposition; by the experiments of Hunter on the teeth of animals fed on madder; by the circumstance that ivory is found to possess considerable strength if cut parallel to the long axis of the tooth, and that it is weak if cut at right angles; and also by many other phænomena of frequent occurrence.

7. When the growth of the ivory is completed, the primary function of the pulp ceases; but its residue, under the influence of disease, *is often observed to ossify in different parts of its substance.* The bony substance thus formed resembles, when viewed under the microscope, the irregular ivory constituting the teeth of many of the lower animals, of fishes for instance, in which the pulp becomes entirely ossified. It consists of irregularly radiating filaments, blended with small calcigerous cells, in which ossified vessels are seen to ramify. In some animals, such as the Bradypus, Trichecus Rosmarus, Megatherium, &c., the pulp ceases at a certain period to be converted into ivory, and a peculiar and imperfect bony substance is then formed, until the whole of the pulp becomes ossified. In short, the simplest forms of teeth are almost exclusively composed of this substance; and in many of those, which consist of cement and ivory without enamel, it fills up the internal cavity. It is so frequently present, is so perfectly different from the other dental formations in the mode of its development, the nature of its function, and the appearance which it presents, that in Mr. Nasmyth's opinion it merited the appellation of the *fourth distinct constituent substance of the tooth.* It is of frequent occurrence in the human subject, but anormally, and in every case in which he had met with it, as the sequela of long-continued disease, either of the tooth itself or of some part of the mouth; but still he said it was proper to observe, that there is no direct evidence to prove that ossification of the residue of the pulp may not take place in the human subject without previous morbid symptoms.

8. The results of Mr. Nasmyth's investigations into the structure of the enamel were not quite in accordance with those of recent writers on the subject. Retzius, Purkinje and others had stated that the enamel consists of fibres running in a direction from the centre to the circumference of the tooth. On making a section of the enamel parallel to the transverse diame-

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* Before quitting this part of the subject, Mr. Nasmyth alluded to the recent researches of Schwann on the structure of elementary tissues, and with respect to the connexion which that author appears only to presume to exist between the unossified pulp and the ivory already formed, quoted the following passage from page 125 of that author's work: "Against the theory that the dental substance is the ossified portion of the pulp, the facility with which the one is separated from the other has been adduced; and I allow the force of this objection. Nevertheless, it is at any rate weakened by the circumstance, that a portion of the pulp actually remains attached to the dental substance, and by the fact, that in half-ossified ribs, for instance, the cartilage can be easily separated from the ossified portion; and it must be remembered, that in the tooth the separation must be easy in proportion to the difference between the consistence of the pulp and of the dental bone."

ter of the tooth, the appearance of fibres as described by these writers was, Mr. Nasmyth allowed, distinctly evident. If, however, a different section be made, for instance, one near the surface, parallel to the long axis or vertical direction of the tooth, an appearance presents itself which had induced him to take a different view of the structure of this substance. This was *an appearance of compartments or divisions* of a semicircular form; the convexity of the semicircle or arch generally looking upwards towards the free external portion of the tooth. Several diagrams illustrating this conformation were here exhibited. In sections, both of enamel and ivory, there will always be observed, said Mr. Nasmyth, isolated cells near the margin, which admit of their form and structure being carefully studied.

All the analyses hitherto published of the chemical composition of the enamel had favoured the conclusion, that it contains only a very small portion of animal matter; but when he had detected the cells or compartments just mentioned, he could not but infer that each of these had for its basis and support a framework of animal tissue. He had accordingly immediately requested his friend Dr. Thomson, of Glasgow, to favour him with a complete analysis of the chemical composition of the different structures of the teeth in their various states of health and disease. The results of this analysis, so far as it had been proceeded with, were highly interesting. He laid them before the Members of the Association in a tabular form, observing, that with respect to the enamel, Dr. Thomson's experiments quite favoured the conclusion *that it was provided with an animal basis*, a result which, as he had just observed, he had previously arrived at by means of microscopic researches.

9. In a separate paper read before the Medical Section of the Association, Mr. Nasmyth detailed his investigations into the structure of the *Epithelium*, which he stated to be also composed of cells. Leeuwenhoek, he said, had been the first to give an accurate account of the structure of this tissue*. Leeuwenhoek stated the human epithelium and epidermis to be composed of scales, of which he has left very accurate descriptions and delineations. He alluded to the scales or cells on the mucous membrane of the mouth, which have since been proved to exist in various forms, on the surface of all mucous and serous membranes, on the inner membrane of the vascular system, &c. *The Epithelium Mr. Nasmyth defined to be a layer of non-vascular but not therefore inorganic substance covering the vascular surface of mucous membranes.* If, said he, a mucous membrane, for instance the conjunctiva, or the buccal, be slightly rubbed, the microscope will show that numerous small particles have been detached from it. At first, being flat bodies with a central nucleus (sometimes absent), and a very thin margin (sometimes curved), they present the appearance of scales, as they were denominated by Leeuwenhoek. Their surface often presents numerous transparent points with very fine lines. The nucleus generally contains a small body, the nucleus-corpuscle. These so-called scales, when removed from an irritated mucous membrane, are found to be smaller and more globular; they have then the usual nucleus and nucleus-corpuscle, but the surrounding structure is smaller, and in the form of a cell. Here and there, too, the nucleus and its corpuscle are seen to be isolated. In a section of the epithelium and mucous membrane numerous nuclei are found in apposition to the latter, which, more externally, are surrounded by a cell, whilst at the surface, this cell, compressed, assumes the appearance of a scale. In the layer of epithelium, from the under surface of the tongue of the calf, these bodies in their various stages of granules, cells and scales, may be well seen, according as the object is removed from or ap-

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* See his Letters to the Royal Society, which may be found in the 3rd and 4th volumes of his collected works.

proximated to, the microscope. (Numerous diagrams illustrating these various stages were laid before the Meeting.)

In the fœtus, the defined and well-formed scales of the epidermis are not unfrequently distinctly seen externally; the *rete Malpighii* consists of newly formed cells, and between the two may be observed other cells in a state of progressive development. On the surface of the vascular mucous membrane *minute cells are found with a nucleus internally, round which the cells grow, and this in short is the process of development of the epithelium.*

With respect to how the epithelium cells are connected together, a subject which had not yet been discussed, Mr. Nasmyth stated, that on the surface of the mucous membrane, the considerable spaces between them are occupied by a gelatinous substance, interspersed with minute granular bodies. This same substance also fills the minute linear intervals between the superficial scales. (Diagrams were exhibited showing the arrangements in both these cases.) The gelatinous medium is considerably elastic, as may be seen under the microscope, on attempting to draw asunder the scales of the moist epithelium. The scales towards the free surface distinctly overlap. The granules of the gelatinous medium give to the epithelium, *en masse*, an appearance of density as they sometimes cover the scales, but can be separated from the latter, and indeed made to disappear entirely by compression. In certain parts of the epithelium of the calf, distinct fibres pass over the surface of the scales and connect them together, thus forming a very delicate network, which is very evident on compression of the thick epithelium on the anterior part of the alveolar arch of the upper jaw.

On the skin and surface of the mucous membranes of man and animals generally, the external layer of scales is continually being thrown off, in consequence of pressure from those in process of development from beneath; after cuticular lamellæ have been detached, their place is regularly occupied again by newly formed scales. In some cases the external layer of cuticle is removed, not scale by scale, but in a continuous form. The cuticle of the frog is composed of minute scales, not overlapping, but in direct apposition, forming one lamina of a beautiful, continuous, tessellated appearance. This is thrown off at once from the entire bodies of frogs and efts. (Mr. Nasmyth here displayed to the Meeting considerable portions of such a cuticle, stating it to be his opinion, that this is the skin which is described by some naturalists as being swallowed as soon as thrown off.) On a microscopic examination of the skin of the frog, cells will be found internally, which gradually change into the shape of scales, as they become more external, in the same manner as has been described above.

Mr. Nasmyth could not but conclude, from a consideration of the phænomena just described, *that the cuticle and epithelium are organized tissues, which are formed, as it appeared to him, from a fluid secretion on the surface of the chorion; the various stages of development being, first, the formation of nuclei and corpuscles; second, that of cells; third, the growth of the latter effected by vital imbibition; fourth, their compression and gradual conversion into minute lamellæ or scales.* It appeared to him a rational conclusion, that the component parts of the cuticle and epithelium have within themselves a power of growth; it remained for pathologists to determine what share the derangement of this function has in the production of cutaneous diseases. The ciliary motions and other vital phænomena furnish new arguments for the organic nature of the epithelium.

Mr. Nasmyth concluded his paper by an especial notice of *the epithelium of the mouth.* In the fœtal subject, previous to the extrusion of the teeth, this forms on the alveolar arch a dense, projecting layer, distinguishable by its whiteness, and by waving and irregular ridges and sulci on its surface. The younger the subject, the thicker is this epithelium. It is most prominent over the molar teeth; its internal surface is concave, receiving the projecting mucous membrane; it is constituted by a mass of scales, superimposed on each other; and hence the terms "dental cartilage," or cartilage of the gum, which have hitherto been applied to this structure, give an erroneous idea of its true nature; for cartilage always presents the corpuscle discovered and described by Purkinje. Here, as in other portions of the epithelium, (except on the surface of the vascular mucous membrane, which presents simple cells with their corpuscles,) the external scales are the largest. In the interior of this alveolar epithelium, where it corresponds to the molar teeth, small vesicles may be frequently observed, varying in size from a quarter to an eighth of a line in diameter. To the naked eye they are transparent; under the microscope their parietes are found to consist of attenuated scales, and their cavity to contain a fluid abounding in minute granules or cells. The internal surface of the alveolar epithelium frequently presents concavities, from a line and a half to three or four lines in circumference, corresponding to projections from the mucous membrane, formed by a larger species of vesicle, which is deeply implanted in the vascular mucous membrane. The parietes of these vesicles are delicate membranes; they contain a transparent fluid, coagulable by heat, acid, or spirit, in which float numerous globules and scales similar to those of the epithelium generally. The external surface of the alveolar epithelium presents, after a slight maceration, numerous fringed processes, measuring from one line to one line and a half in length, and half a line in breadth. Under the microscope these ringes are found to be composed of elongated scales connected together, forming masses, which divide and subdivide, until they attain such an extreme tenuity, that the most minute terminations consist but of two scales, in marginal apposition. If the epithelium be carefully separated from the surface of the mucous membrane corresponding to the unextruded molar teeth, and placed in water, or in diluted spirit of wine for some little time, its external surface presents these fringes much enlarged, and forming a mass more considerable in size than the dense epithelium itself.

Note on the following passage from page 1.

" Notices of Mr. Nasmyth's papers appeared in the Athenæum and Literary Gazette of the period : those journals usually obtain such notices either from authors themselves or from reporters of their own : in the present case the Council have been informed by the respective editors, that the report in the Athenæum of the two papers read to the Medical Section was supplied, and the proofs corrected, by Mr. Nasmyth himself, and the notice of the geological paper by the reporter of the Athenæum ; and that the report in the Literary Gazette was drawn up by the reporter of that journal, from a rough manuscript furnished to him by Mr. Nasmyth."

When the inconsistencies between these contemporaneous reports and Mr. Nasmyth's subsequent claims to the discovery of the formation of the teeth by ossification of the pulp were pointed out, he replied, " My answer to this is, that I did *not* furnish the report to the Literary Gazette, from which Mr. Owen draws much of his pretended evidence, and that the notice of my papers, which I sent to the Athenæum, was so abbreviated and cut to pieces that I cannot be responsible for it."—*Medical Gazette*, June 26, 1840, p. 545.